

Advantages of Open Source Based e-learning Tools in the Collaboration and Training in the Agricultural Education

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Abstract. One of the primary benefits of open source software is that it reduces the costs to produce systems and services. Traditional proprietary software vendors are realizing this fact, and are beginning to build their closed software products quietly using lots of open source software. In the long-run, competition will force these cost savings to be passed to the consumer. In this paper the most important free and commercial e-Learning systems and their functional features, modules, standards, hardware and software requirements by Vendor's Web sites and different e-Learning service portals are shortly summarized and compared. We selected the Moodle system within an European projects, which is a software package for producing Internet-based courses and web sites. It is an ongoing development project designed to support a social constructionist framework of education. The aim of our European project was to promote the use of multimedia knowledge in adult training / lifelong learning in order to facilitate competitiveness, employability and mobility of adults who are victims of the digital divide or of some of its components such as distance, initial level of knowledge, language, use of complex technologies. One of the results of the NODES project is that we introduced the Moodle system into the graduate, postgraduate PhD, adult trainings programmes and it is a very successful system as an educational portal system for our faculty. We are using some extended tools in Moodle such as the Word templates for easy making Moodle questionnaires, Covcell Audio/Video Conferencing Tool, Inwicast Mediacenter, Audio recorder, AutoView Presenter which allows you to put video on-line with synchronised slides.

Keyword. open source software, e-Learning technologies, NODES, Moodle

Introduction

Open Source Software are free applications released under special licensing terms where the core coding is viewable and able to be edited to suit the needs of the user. Basically, an author or company creates an application then releases it for free distribution, sometimes in coordinated projects where it can be further developed by a community of programmers, working individually or in teams, to further refine the product. Sometimes thousands of programmers are involved. Open Source applications cover a myriad of uses from entertainment to enterprise ecommerce. In fact, there's a very good chance that the server your site is hosted on may be powered entirely or in part by Open Source products. The principles of Open Source Software are

- Free redistribution
- Source code must be included
- Must allow modifications and derived works
- Integrity of the author's source code
- No discrimination against persons or groups
- No discrimination against fields of endeavor
- A single license must apply to all users
- License must be technology-neutral.

Licensing usually falls under two categories - the GNU GPL and the GNU LGPL. The major difference between the two is that the LGPL has more restrictions on use and redistribution. While the core software itself is free, there can be aspects that aren't. For example, you can be charged for a CD containing a copy of the software. (Bloch, 2007)

Advantages of using Open Source software

Open Source software has formed the base of many successful and profitable businesses. Some of the advantages include:

- **Core software is free:** If you're just getting started in online business, cost can be a major factor. Using Open Source software can really cut down on your initial capital outlay. It's also my firm belief that the Open Source community has helped to rein in prices on commercial software over the years.

- **Evolving software:** As mentioned, some Open Source software projects can have huge communities of programmers involved, allowing for the rapid implementation of new features and security fixes. The communities of users and programmers are also invaluable resources for asking questions relating to troubleshooting and suggesting enhancements.
- **Encourages hands on:** When you're short on cash, you are more than likely to want to make modifications to software yourself. If I'm no programmer, but the use of Open Source software has encouraged me to go beyond the user interface; to dig into code to try and understand what it does and to make minor edits. As a business owner, it doesn't hurt to understand a little of the voodoo that goes on behind the scenes in the software you use on your site.
- **Not tied to a single vendor:** If you purchase a commercial application, you can then become reliant on a single company to solve your problems and maintain the software, which can also be very expensive. Some commercial software companies may only provide support and upgrades for a limited time before you need to fork out for any further enhancements or assistance.

Disadvantages of using Open Source software

There's a flip side to everything, and in the case of Open Source software it all boils down to the old saying of "there's no such thing as a free lunch". Most of the disadvantages only apply if you're not somewhat code-savvy and willing to get your hands dirty:

- **Projects can die:** Just as with commercial applications, some Open Source projects stall and die - programmers just lose interest with being involved or they become fraught with infighting; arresting further development. You may be left using an application that is full of security bugs, with no-one to fix them; or if you can get them fixed, it will usually require paying someone to do it.
- **Support issues:** If you are using commercial software, the vendor has an obligation to assist you in a timely manner, especially where security bugs are involved. You may find an annoying bug in an Open Source application that you need assistance with, but you may not get it without paying someone to fix it.

Making the decision

With the plethora of Open Source applications available, you might conclude that you'll never have to buy software. That is quite true, but where you will probably pay for it is in time. Time to set it up, time in modification and time in troubleshooting. If you don't have the time for those things, you'll need to determine if you have the cash to employ others before you go ahead with implementation. Not only that, but whether reliable contractors are available to maintain the software.

If you do decide that Open Source software is right for you, examine all the various software options carefully first.

- Is the software well established or still in it's infancy?
- Are there regular updates, patches and new features?
- Is there a support forum?
- Are the support forums active?
- Do forum participants help each other out?
- Are reputable companies using the software?
- Is the documentation complete and coherent?
- What are the general costs with hiring contractors who are familiar with the software?

The entire online community, from end users to webmasters and merchants owes the Open Source community a great deal for what it's accomplished over the years.

Open source LMS selection in the NODES project

The aim of the NODES project was to use the multimedia knowledge, in order to facilitate competitiveness, employability and mobility of adults who are victims of the digital divide or some of its components such as distance, initial level of knowledge, language, use of complex technologies. We needed to study the 'What is existing in GNU/GPL software' in the NODES context. This paper summarizes the survey of the most important e-Learning systems (free and commercial) and their functional features, modules, standards, hardware and software requirements.

The study could be an input for the further steps. It tried to give information to select and develop a free licensed system for the several target groups. We studied a lot of e-Learning systems. One of our tasks in the Nodes project was to study the existing open source or commercial e-learning software. The aim of the investigation of these systems was to survey the most important functional features, modules, standards, hardware and software requirements. The EduTools Web site offers independent analysis and tools for evaluating course management systems, student services software and e-learning policies (EduTools 2007)

After the comparison of the e-Learning systems by several methods, we had to evaluate the most important parameters, which were suitable suggestion for the project management. These parameters were evaluated.

Evaluating aspects

- Technical flexibility: Hardware and software requirements, Support, Cost/License, Authentication
- Learning tools: Forums, Materials, Messenger, Chat, Exercises, Group work, Student tracking.
- Usability: Technical knowledge/installation, Course templates, Standards, Languages.

Reviewing these parameters, our suggestion was the Moodle or the ATutor. We examined these systems in details. Both of them are fully compatible with the current Shareable Content Object Reference Model (SCORM) standards for sharing content between different LMSs. Additionally, both of the systems use XML metadata to describe e-learning content within the systems. Yet, without the encumbering technical elements of the SCORM the authoring process for new courses is much simplified. Creating a new course can be as simple as designing several different 'pages' (Moodle, ATutor) of content, and then organizing them so that they flow in a logical manner. In addition consultants can assign specific resources to each slide. In Moodle and ATutor there would not be a requirement for HTML knowledge when authoring content.

The collaborative features included in the learning environments vary in both complexity and usability. The ATutor is the only system having an internal 'e-mail' system which allows course users to intercommunicate. We believe that this is a very useful feature to have within a LMS, as it promotes collaboration between users. Additionally, each system requires a valid e-mail address to be collected from each user so communication via external e-mail systems would be entirely possible.

On an authoring note, we found that Moodle's interface for creating course content was the most intuitive, and it is very simple to use What You See Is What You Get (WYSIWYG) editor. The use of this editor would remove the need for the consultants to learn any Internet display languages such as Hyper Text Mark-Up Language (HTML), which would significantly reduce the development time required to start creating course content.

Finally we selected the Moodle which is a software package for producing internet-based courses and web sites (Varallai and Herdon, 2007). It is an ongoing development project designed to support a social constructionist framework of education. Moodle is provided freely as Open Source software (under the GNU Public License). Basically this means Moodle is copyrighted, but that you have additional freedom. You are allowed to copy, use and modify Moodle provided that you agree: to provide the source to others; not to modify or remove the original license, and apply this same license to any derivative work. Moodle will run on any computer which can run PHP, and can support many types of database. The word Moodle was originally an acronym for Modular Object-Oriented Dynamic Learning Environment, which is mostly useful to programmers and education theorists. It's also a verb that describes the process of lazily meandering through something, doing things as it occurs to you to do them, an enjoyable tinkering that often leads to insight and creativity. So it applies both to the way Moodle was developed, and to the way a student or teacher might approach studying or teaching an online course.

The architecture of the NODES

Figure 1 shows the NODES Network (central repository) was built up the and how the participant countries and the actors (trainer, learner, content designer and manager) are connected. The main parts of the logical architecture are the following:

- Learning Management System, LMS
- Local – National Repository, LNR
- Knowledge Databank Management System KD CMS / KMS
- Specific and Shared Databases, SSD
- EU Index, EUI
- Internet, Content Access and Security Rules, I-CASR
- NODE point: Physical implementation and network infrastructures
- The NODES virtual central services and infrastructure
- Asynchronous and RT (Rural Transport) Services and Support in Adult Education
- IP Networks and Internet
- The services of the NODES project management.

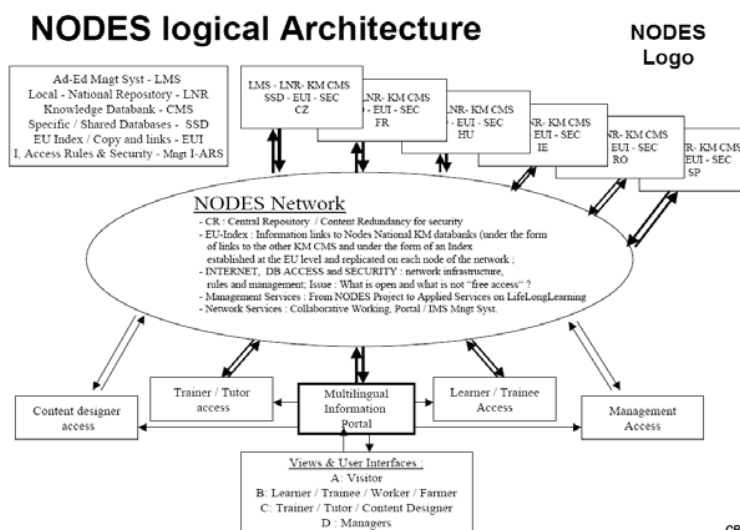


Figure 1: NODES Logical Architecture (Garcia, 2007)

Moodle in the aspects of NODES Project

The Moodle provides a reliable platform that supports social and collaborative learning. It is highly configurable and extensible, it implements new features rapidly and it is free of licensing costs. The members of the NODES project (from France, Spain, Ireland, Hungary, Czech Republic and Romania) implemented the Moodle system creating the LMS. To integrate the different contents we had to develop the EU-index, which is the central, common and shared index database (a meta-database). The EU Index, the merging of each local - national index (based on KD - Knowledge Database - and selected links like available resources / websites / etc.). The EU-index is based on the Dublin Core Patent. The Dublin Core Metadata Element Set is a vocabulary of fifteen properties for use in resource description. Another important function is the multimedia content management. One of these parts is the video objects. We are using modules and blocks from the about 200 Moodle ones, for example the AutoView Presenter which allows you to put video on-line with synchronized slides. The NODES system is used in graduate, postgraduate, PhD, adult trainings program and it is a very successful system as an educational portal system for our faculty too.

In the framework of the National Rural Development Plan 2004-2006 400 consultants carried out advisory tasks for public-benefit. From the civil servants of the Ministry's Agricultural Offices in the counties the village agri-economist experts (650) – related to their public administration tasks- also supply farmers with general information and advice. The aim is to increase the number of farmers making use of the special advisory services by 35.000 in the years between 2007 and 2013. Relating to this aims the Hungarian partner of NODES project organized NODES training for village agri-economist experts. 21 village agri-economist experts took part on the training from Hajdú-Bihar county (neighbourhood of Debrecen). It is important, because they can be potentially tutors of the farmers. Their tasks are the training of the farmers by distance learning using the modern information and communication technology (e-Learning).

- In the first block we introduced them our department work. The trainer focused on the Agricultural Computer Engineer field of study (basic and advanced subjects, as well special subjects from the 7 semester). In the second part he spoke about the Information and public administration agricultural engineer BSc education and the European Master initiative.
- In the second block we introduced them the development of Internet technology from the beginning till nowadays and the expected future. The presentation focused on the Web 2.0 technologies
- The third block introduced them using of e-Learning framework system, the Moodle. The presentation focused on the Moodle system. He could show some statistical data about using this system in the last

year. Now we have more than 1000 students and more than 30 courses. In the second part of this presentation they could get picture about the using of the Moodle system.

- Finally, the participants filled out a questionnaire. The assessment of this questionnaire is in progress. Generally we can say, the village agri-economist experts want to learn basic Information Technology. The most important are: operation systems, word processing, spread-sheeting, Internet and Communication. Nowadays, it seems that the most important is the Internet and Communication module, because the village agri-economist experts having to fill in a CAP (Common Agricultural Policy) application form, using this knowledge. (Herdon and Lengyel, 2008)

Using Moodle at UD

We have been using Moodle at the University of Debrecen, Business- and Agricultural Department since January 2007. Moodle has more and more function at our Department in education. In January 2008 we introduced Moodle in our Faculty. Therefore, we gave lessons for the tutors about the usage of the Moodle. Our aim was to develop such a learning system, which is an integral part of educational process.

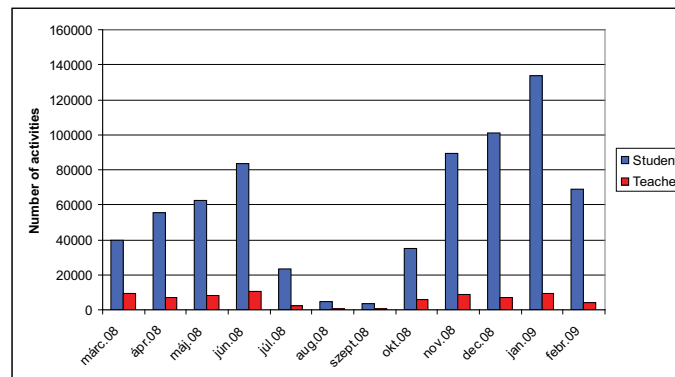


Figure 2: Statistics of a Moodle system in the number of activities

We used the Moodle in class-works in the framework of 5 subjects in the beginning, in the 2nd half of the 2006/2007 academic year. In the informatics category the number of the active courses increased to 17 in the 1st half of the 2007/2008 academic year. We showed Moodle system on the courses organized for the instructors where we took an introduction of the system and where we outlined the function of the system and its applicability. The aim of the course was to make our trainings more coloured and more efficient, and the rest of the departments of the faculty use it in the educational process with our vocational support. The system has been used in BSc, MSc, PhD and Erasmus (for foreign students) trainings. Our department got advantage of the functions of the framework system in our training and in the NODES Project too. This system and others are used in different agricultural training programs. (Gaceu and Tzortzios and Gruia 2006).

Currently 91 instructors of the 6 departments of the faculty - on 26 specializations with 167 courses - use the system, through which more than 3600 students were involved in the educational process. On the Figure 2 shows the usage of Moodle from 2008 March to 2008 December.

Complementary tools in Moodle

There are several possibilities to create a new curriculum in Moodle. For the students this is a virtual learning environment, the same place as the virtual education environment for the pedagogue (Benda and Lohr and David J, 2008). We use the basic activities to create a course, but we can use some complementary tools too. There are about 200 modules and blocks which are available from moodle.org website.

We use for example AutoView Presenter which allows you to put video on-line with synchronized slides. A web based editing interface is used to configure the video/slide sources and to set the slide trigger times. Besides this module we tested and we use some modules, which can be very useful in material development. We give a short list about these modules.

- A Microsoft Word template for easy making Moodle questionnaires. Questions are exported into a Moodle XML file, which can be then imported into your course's question bank. The template allows

creating of multiple choice, true/false, short answer, numerical, matching, as well as missing word questions;

- Covcell Audio/Video Conferencing Tool. Conferences can be audio, video or mixed. The number of participants depends on the available bandwidth. Conferences of more than three participants can be moderated or unmoderated.
- Inwicast Mediacenter is a bloc module which adds multimedia capabilities to Moodle so that teachers can easily publish, manage and share audio and video podcasts in various formats (flash flv, mp3, mp4, wmv, mov, etc). The main purpose of this module will be distributing (Streaming) video content along with some notes and attachments to the students. Also the students can keep their personal notes about the video/teacher's note. Podcasting is an opportunity to extend and improve lectures beyond classrooms. (Cebeci and Tekdal, 2006)
- Audio recorder. This learning tool allows students to record an mp3 audio file, saving to a local folder. The student can then upload it as an assignment. It works similar to the assignment module.

Video and slide sources in Moodle

AutoView Presenter allows you to put video on-line with synchronised slides. A web based editing interface (Figure 3.) is used to configure the video/slide sources and to set the slide trigger times. In order to put together an AutoView presentation you will need a Macromedia Flash movie which contains the slides and a video file which can be played as a progressive download from Moodle, or alternatively a video loaded onto a streaming video server.

Slides can be prepared in Powerpoint (or similar formats), but you will need to import your slides into Open Office to create the final Flash movie. Once you have your slides in OpenOffice, use the File/Export menu option. Select Macromedia Flash (SWF) (.swf) from the file format drop down, choose a file name and save the slides. You might be able to use Flash files created by other PPT-SWF conversion software. Alternatively, if you can't access OpenOffice to create the flash movie, you can use a set of image files. Manual creation of these files could be quite laborious; you will need to export your presentation as JPEG images



Figure 3. Using AutoView module in Moodle

In theory any video which can be played by one of the supported video plugins could be used with these presentations. In practice, you would want a video that has been prepared with low bit rate, (56k for modem use or 256k-512k for broadband). The following file formats are recommended: MPEG 4 (.mp4), Quicktime (.mov), Windows Media (.wmv or .asf), Real Player (.rm).

The module requires two parameters, the first is a name, and the second is an XML configuration file which AutoView will use to store the presentation data. AutoView is designed to be portable; using a separate XML configuration file instead of storing information in the Moodle database will make it easier for us to produce implementations for other systems. This file will be created for you by AutoView if you don't have one already, all you need to do is enter the file name you want AutoView to use for the XML config file. (Lengyel, Herdon, 2008)

Once you have set the slide titles, the linking between the video and the slides can be set up. Press the play button on the video plugin to start the video. Every time you reach a slide change point in the video, click the Move and Set button. Do this until you have set time indexes for all the slides. You can manually adjust the time indexes by typing in a time index into the boxes on the left.

Conclusion

For those who already have adopted of Open Source software for teaching and learning and who may have concrete evidence about the total cost of ownership of Open Source applications. Considering the e-learning environment in which the necessary function should be implemented, we found that the open source approach offers great guarantee of flexibility and easy maintenance.

The success of a learning technology depends on its widespread use in different applications and platforms. So as we continue to improve and develop interoperability standards for learning we should also try to facilitate its diffusion and acquisition. (Cebeci, Erdoğan, 2005)

There are many technical and educational challenges yet to be solved, but the success of open education in other areas (open source course management systems and open content) provides hope for finding a solution to the challenge of sharing "open teaching". We hope that we may make our education more efficient with using Moodle and the integrated environments might prove to be a very satisfactory platform for online continuing education.

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